Egyptian Pediatric Association Gazette (2016) **64**, 149–153

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Contents lists available at ScienceDirect

Egyptian Pediatric Association Gazette

journal homepage: http://www.elsevier.com/locate/epag

Food addiction relations to depression and anxiety in Egyptian adolescents

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Received 13 June 2016; accepted 4 September 2016
Available online 21 September 2016

KEYWORDS

Food addiction;
Depression;
Anxiety;
Adolescents;
Obesity

Abstract *Introduction:* Food addiction (FA) is a recent term used to describe craving for food in addition to functional impairment. FA has not been thoroughly studied in adolescents, so the aim of this study was to assess its presence in Egyptian adolescents and its relations to some psychiatric correlates; anxiety and depression.

Subjects and methods: A cross sectional design was used. Four hundred adolescents were interviewed from the different geographic locations in Cairo to assess FA by the Yale Food Addiction Scale (YFAS), depression by the Child Depression Inventory (CDI) scale and anxiety by the Screen for Child Anxiety Related Disorders (SCARED) child version questionnaire.

Results: FA was present in 12% of the studied adolescents. Depression was present in 74 adolescents (18.5%). FA and depression coexisted in 5 subjects (10.4%). The diagnosis of anxiety was met in 38 adolescents (9.5%) and it coexisted with food addiction in only one adolescent (2%). FA scores showed moderately significant positive correlations with most of the anxiety subtypes as well as with the total score for anxiety and depression. Some FA symptomatology were significantly different between those with and without anxiety and depression.

Conclusion: FA exists in Egyptian adolescents and has strong associations with psychiatric comorbidities. Anxiety and depression should be evaluated in every individual with FA and vice versa as these psychiatric morbidities may be the inciting factor for the development of food addiction. Evaluation and treatment should address all the existent comorbidities. Careful attention should be paid to the presence of excess food consumption despite knowledge of adverse consequences, tolerance, withdrawal symptoms and important social or occupational activities given up or reduced because their presence coincided in this study with the presence of depression and/or anxiety which makes psychiatric evaluation more valuable.

Introduction

Obesity is one of the major public health problems particularly in adolescents as they are highly predisposed to become obese

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Peer review under responsibility of Egyptian Pediatric Association Gazette.

http://dx.doi.org/10.1016/j.epag.2016.09.002

adults if they don't lose weight.[1] Obese adolescents are more likely to suffer more obesity related complications than their lean counterparts.[2] Therefore, measures taken to reduce obesity are of paramount importance nowadays. However, not all measures are successful; namely healthy food habits and doing regular physical exercise which reflect the difficulty in weight control as the larger percentage of those who lose weight regain the lost weight again.[3] This may largely be due to food craving and the negative impact that food abstinence causes, which was termed in recent years food addiction (FA).[4] FA has been widely discussed and proposed in recent years as a documented obesity phenotype.[5] FA has been well documented in adults as a contributor to obesity[4] but very few studies addressed its presence in adolescents.[6] Addictive behaviour to food shares some common features with substance dependence[7] and its presence in an individual is multifactorial including the genetic make-up, environmental influences regarding the proximity and availability of some palatable foods, neurotransmitters particularly dopamine and the rewarding effect of food that provides pleasurable sensation for some individuals particularly some high-fat and high-sugar foods.[6] Gearhardt et al. 2013[4] developed the Yale Food Addiction Scale to assess the presence of FA according to some symptomatology in addition to functional impairment. The new terminology of FA explains some of the eating behaviours that are not currently classified under one of the known categories of disordered eating.[8] Seeing or tasting highly palatable foods stimulate the striato-nigro-striatal circuit as addictive substances do. The concept of FA highlights the role played by the presence of an environment rich in highly palatable foods in the current obesity epidemic.[6] Adults seeking bariatric surgery for weight loss who were interviewed by the YFAS and diagnosed with FA showed higher levels of depression.[9] There were very few data on children and adolescents suffering from FA regarding their psychiatric comorbidities.

This primary aim of this study was the detection of FA prevalence in a representative sample of adolescents in primary and secondary schools and relation of the presence of FA to the comorbid depression and/or anxiety. The secondary aim was to correlate the presence of depression and anxiety to the individual components of the FA score to highlight for further studies the possible neuronal circuits involved in these comorbidities so that therapy can be tailored according to each individual patient.

Subjects and methods

Study design

This was a cross sectional study that was conducted over 9 months from September 2014 to May 2015. The study included 400 adolescents, 196 (49%) males and 204 (51%) females in preparatory and secondary schools distributed equally between governmental and public domains. Their ages ranged from 12 to 17.6 years.

Sample size justification

The sample size was 400 adolescents which is the maximum number that could be calculated for measuring the prevalence in a cross section study. The sample was estimated based on the formula given in the following equation:

$$n = \frac{z^2 \times (p * 1 - p)}{\delta^2}$$

z = z value (e.g. 1.96 for 95% confidence interval).
p = Percentage picking a choice.
δ = Error margin = 0.05.

Psychiatric evaluation

All the involved subjects had an interview and completed questionnaires to detect:

Food addiction: through the Yale Food Addiction Scale (YFAS) for children[4] which is a validated self-administered questionnaire containing 25 questions assessing the symptoms of FA in addition to significant functional impairment. Translation into Arabic was done by the researchers and reviewed by three experts to be sure of its validity. Food addiction was diagnosed if the symptom count is 3 or more and clinically significant impairment or distress is present.[10]

Depression was assessed by the Child Depression Inventory (CDI) Scale[11] which is a validated questionnaire containing 27 questions about the different symptomatology of depression then according to the symptom score, the participant is classified as either having no depressive symptomatology, mild, moderate or severe depression.

Anxiety was assessed by the Screen for Child Anxiety Related Disorders (SCARED) child version questionnaire[12] which is a 41 self-assessed questionnaire that covers the subtypes of anxiety; namely, panic disorder, generalised anxiety disorder (GAD), separation anxiety disorder, social anxiety and significant school avoidance. A score >30 is specific for the presence of anxiety.

Ethical approval

The study was approved by the local ethics committee of Ain Shams University and the Egyptian Ministry of Education as

Table 1 Prevalence of food addiction and its symptomatology in the studied participants.

Food addiction symptom (Number = 400)	Number of subjects fulfilling criteria (%)
Loss of control (large amount taken in longer period)	79 (19.8)
Persistent desire or repeated unsuccessful attempts to quit	204 (51.0)
Much time and activity taken to recover	76 (19.0)
Important social or occupational activities given up or reduced	126 (31.5)
Use continues despite knowledge of adverse consequences	92 (23.0)
Tolerance (marked increase in amount, marked decrease in effect)	216 (54.0)
Withdrawal symptoms, substance taken to relieve withdrawal	137 (34.3)
Use causes clinically significant impairment or distress	63 (15.8)
Food addiction	48 (12.0)

Table 2 Anxiety and its subtypes in the studied subjects.

Diagnosis (Number = 400)	Number (%)
Separation anxiety disorder	74 (18.5)
Social anxiety	63 (15.75)
Generalised anxiety disorder	39 (9.75)
School avoidance	41 (10.25)
Panic disorder	37 (9.25)
Anxiety (i.e. total score >30)	38 (9.5)

N.B. Some adolescents showed symptoms of more than one subtype of anxiety.

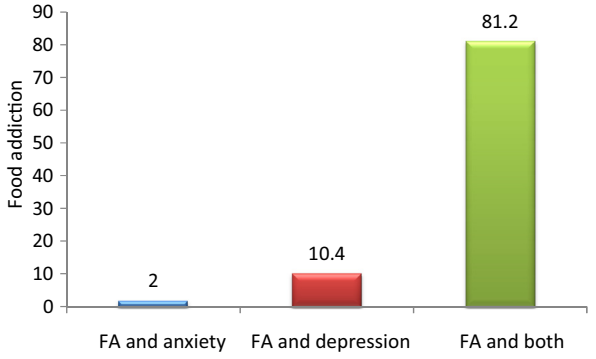

Figure 1 Percentage of FA and comorbid anxiety only, FA and comorbid depression only and FA and comorbid anxiety and depression symptomatology in the studied participants. FA = food addiction.

well as the administrative departments of the involved schools. Verbal assent was obtained from all adolescents participating in the study on the day of the interview.

Statistical data analysis

All analyses were performed with Portable PASW statistics 18 statistical package. The mean ± SD was used for quantitative variables and frequency and percentage for qualitative variables. Comparison was done using Chi-square test for qualitative variables and Student *t*-test for quantitative variables. A value of $p < 0.05$ was considered statistically significant.

Results

The diagnosis of FA was met in 48 adolescents (12%). There was no gender difference between subjects diagnosed with food addiction ($p = 0.64$). The frequency of the different FA symptomatology is listed in Table 1. Depression was present in 74 adolescents (18.5%) 50 suffered from mild depression (12.5%) and 24 had moderate depression (6%). The diagnosis of anxiety was met in 38 adolescents (9.5%). The subtypes of anxiety are shown in Table 2 which shows that the most prevalent of these subtypes was the separation anxiety disorder. FA and depression coexisted in 5 subjects (10.4%) and it coexisted with anxiety in only one adolescent (2%). However, most of those diagnosed with food addiction had coexisting symptomatology of depression and anxiety as shown in Fig. 1.

There was a significant difference between the presence and absence of depression and its degree (no depression, mild and moderate depression) in patients with FA ($p \leqslant 0.001$). Similarly, there was a statistically significant difference between the presence and absence of anxiety and FA ($p = 0.035$). FA scores showed moderately significant positive correlations with the subtype anxiety scores except for the separation anxiety for which the correlation was mild. FA scores correlated as well with the total score for anxiety and depression (Table 3).

Depression was significantly different in adolescents with some food addiction symptomatology; namely, loss of control ($p = 0.003$), repeated unsuccessful attempts to quit ($p = 0.017$), continuous use of food regardless of adverse consequences ($p \leqslant 0.001$), important social or occupational activities given up or reduced ($p = 0.007$), tolerance ($p = 0.006$) and withdrawal symptoms resulting from the absence of food ($p = 0.047$). The intake of food to relieve withdrawal and much time and activity taken to recover didn't show significant differences, $p = 0.06$, $p = 0.053$ respectively.

Anxiety was significantly different in adolescents with some food addiction symptomatology; namely, much time and activity taken to recover ($p \leqslant 0.001$), important social or occupational activities given up or reduced ($p = 0.007$), continuous use of food despite knowledge of adverse consequences ($p \leqslant 0.001$), tolerance ($p = 0.006$) and presence of withdrawal symptoms when not taking food ($p = 0.047$); whereas loss of control and persistent desire or repeated unsuccessful attempts to quit didn't show such significant correlations, $p = 0.074$ and 0.057 respectively.

Discussion

This study documented the presence of FA in a representative sample of Egyptian adolescents and the comorbid psychiatric conditions; namely anxiety and depression. FA was present in 12% of the studied adolescents which was similar to that published by Pursey et al. 2014[10] in a systematic review which calculated the weighted mean of proper studies on FA to be 19.9%. This suggests that even youngsters can develop addictive trends towards food. This study showed that the prevalence of depression was 18.5% in Cairo which was similar to

Table 3 Correlations between food addiction score and depression, anxiety subtypes and the total anxiety symptomatology score.

		Depression (total score)	Panic disorder or somatic symptoms	Generalised anxiety	Separation anxiety	Social anxiety	School avoidance	Anxiety (total score)
FA score	*r*	0.321	0.322	0.318	0.182	0.207	0.228	0.356
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

that assessed in secondary school students in Menoufia governorate (11.3%) with similar distribution of mild and moderate depression; mild depression was nearly twice as moderate depression with no subjects diagnosed with severe depression in school students of both studies. The most prevalent anxiety subtype was separation anxiety followed by social anxiety (Table 2) in consistence with the study done by Spence et al. 2001[13] who found these 2 subtypes of anxiety the most prevalent anxiety symptoms in adolescents.

Mood disorders and anxiety were associated with binge eating, anorexia nervosa and bulimia nervosa and in previous studies.[14,15] Furthermore, the co-occurrence of depression and anxiety with eating disorders implied poorer quality of life.[16] This study was designed to fill the knowledge gap regarding FA association with anxiety and depression. Our study revealed that FA coexisted with both anxiety and depression singly or in combination. FA scores correlated positively with anxiety and depression scores which indicate that the severity of FA can affect the severity of anxiety and depression symptomatology and that evaluation and treatment of individuals with these associations should be directed at all existent comorbidities.

In contrast to our results, a similar study[6] showed no correlations between the presence of FA and either anxiety or depression. This may be due to their small sample size as they included only 65 children and adolescents aged 9–14 years in contrast to our study. Another explanation for the difference is that they used different scales for measuring anxiety and depression despite using the same scale for FA. No similar studies addressing the relation between FA and comorbid depression and anxiety were found in adolescents and this is an area of further research. However, previous studies demonstrated that anxiety and depression triggered addictive human behaviours.[17] A careful psychiatric evaluation is warranted for all subjects diagnosed with FA to detect and treat the associated psychiatric comorbidities such as depression and anxiety. The co-occurring psychiatric symptomatology should not be neglected. Furthermore, follow up studies are of utmost importance to demonstrate whether or not treatment of these psychiatric comorbidities and symptomatology improves the treatment outcome for FA in obese subjects on different weight loss programmes. FA symptomatology should be assessed in adolescents and careful attention should be paid to the presence of the following symptoms; excess food consumption despite knowledge of adverse consequences, tolerance, withdrawal symptoms and important social or occupational activities given up or reduced because their presence coincided in this study with the presence of depression and/or anxiety which makes psychiatric evaluation more valuable.

Limitations of the study

Detailed assessment of the socioeconomic status was not properly assessed as it needed interviewing of the parents which was not feasible in the current study. Instead we distributed the sample equally between governmental and private schools which gives roughly equal distribution of the socioeconomic levels.

Conflict of interest

The authors have no conflict of interest to declare.

Acknowledgement

The authors would like to acknowledge Dr Ashley Gearhardt, Assistant Professor of Psychology, University of Michigan for her kind permission to use the YFAS as well as her generous help in providing the corresponding author with beneficial papers and the necessary package for scoring the answers of the studied participants.

References

1. Reilly JJ, Kelly J. Long-term impact of overweight and obesity in childhood and adolescence on morbidity and premature mortality in adulthood: systematic review. *Int J Obes* 2011;**35**(7):891–8.
2. Franks PW, Hanson RL, Knowler WC, Sievers ML, Bennett PH, Looker HC. Childhood obesity, other cardiovascular risk factors, and premature death. *N Engl J Med* 2010;**362**(6):485–93.
3. Dietz W, Robinson TN. Assessment and treatment of childhood obesity. *Pediatr Rev* 1993;**14**(9):337–43.
4. Gearhardt AN, Roberto CA, Seamans MJ, Corbin WR, Brownell KD. Preliminary validation of the Yale Food Addiction Scale for children. *Eat Behav* 2013;**14**(4):508–12.
5. Davis C, Curtis C, Levitan RD, Carter JC, Kaplan AS, Kennedy JL. Evidence that 'food addiction' is a valid phenotype of obesity. *Appetite* 2011;**57**(3):711–7.
6. Laurent JS, Sibold J. Addictive-like eating, body mass index, and psychological correlates in a community sample of preadolescents. *J Pediatr Health Care* 2016;**30**(3):216–23.
7. Cathelain S, Brunault P, Ballon N, Réveillère C, Courtois R. Food addiction: definition, measurement and limits of the concept, associated factors, therapeutic and clinical implications. *Presse Med* 2016. http://dx.doi.org/10.1016/j.lpm.2016.03.014 [Epub ahead of print].
8. Gearhardt AN, Boswell RG, White MA. The association of "food addiction" with disordered eating and body mass index. *Eat Behav* 2014;**15**(3):427–33.
9. Koball AM, Clark MM, Collazo-Clavell M, Kellogg T, Ames G, Ebbert J, Grothe KB. The relationship among food addiction, negative mood, and eating-disordered behaviors in patients seeking to have bariatric surgery. *Surg Obes Relat Dis* 2016;**12**(1):165–70.
10. Pursey KM, Stanwell P, Gearhardt AN, Collins CE, Burrows TL. The prevalence of food addiction as assessed by the Yale Food Addiction Scale: a systematic review. *Nutrients* 2014;**6**(10):4552–90, 21.
11. Kovacs M, Beck AT. An empirical-clinical approach toward a definition of childhood depression. In: Schulterbrandt JG, Raskin A, editors. *Depression in childhood: diagnosis, treatment and conceptual models*. New York, NY: Raven Press; 1977. p. 1–25.
12. Birmaher B, Brent DA, Chiappetta L, Bridge J, Monga S, Baugher M. Psychometric properties of the screen for child anxiety related emotional disorders (SCARED): a replication study. *J Am Acad Child Adolesc Psychiatry* 1999;**38**:1230–6.
13. Spence SH, Rapee R, McDonald C, Ingram M. The structure of anxiety symptoms among preschoolers. *Behav Res Ther* 2001;**39**(11):1293–316.
14. Hughes EK, Goldschmidt AB, Labuschagne Z, Loeb KL, Sawyer D, Le Grange D. Eating disorders with and without comorbid depression and anxiety: similarities and differences in a clinical

sample of children and adolescents. *Eur Eat Disord Rev* 2013;**21**(5):386–94.

15. McElroy SL, Crow S, Blom TJ, Biernacka JM, Winham SJ, Geske AB, Cuellar-Barboza AB, Bobo WV, Prieto ML, Veldic M, Mori LR, Seymour LR, Bond DJ, Frye MA. Prevalence and correlates of DSM-5 eating disorders in patients with bipolar disorder. *J Affect Disord* 2016;**191**:216–21.
16. Padierna A, Quintana J, Arostegui I, Gonzalez N, Horcajo M. The health-related quality of life in eating disorders. *Qual Life Res* 2000;**9**(6):667–74.
17. Parylak SL, Koob GF, Zorrilla EP. The dark side of food addiction. *Physiol Behav* 2011;**104**(1):149–56, 25.